

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 3.79995/001		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/EP2004/007033		International filing date (day/month/year) 29.06.2004		Priority date (day/month/year) 30.06.2003
International Patent Classification (IPC) or national classification and IPC B05D1/26, C08L23/08, C08F2/00, C08F2/14, C08F2/34, C08F210/16, C08F210/02, B29C47/02				
Applicant BOREALIS TECHNOLOGY OY et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 3 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 31.01.2005		Date of completion of this report 07.04.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Lippert, S Telephone No. +49 89 2399-8514		



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/007033

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-29
as originally filed

Claims, Numbers

1-15
received on 31.01.2005 with letter of 31.01.2005

Drawings, Sheets

1/2-2/2
as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/007033

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-15
	No: Claims	
Inventive step (IS)	Yes: Claims	1-15
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-15
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2004/007033

ad V:

1. The claimed subject-matter is considered to be novel as none of the prior art documents cited in the International Search Report discloses an extrusion coating comprising a multimodal polyethylene having as comonomers to ethylene at least two different C₄-C₁₂ alpha olefins (Art.33(2) PCT).
2. The claimed subject-matter is considered to be inventive as the specific combination of features as now claimed cannot be derived from the prior art documents cited in the International Search Report alone or in combination in an obvious way (Art.33(3) PCT).
3. Industrial applicability is given (Art.33(4) PCT).

ad VIII:

1. The description is not adapted to the new set of claims (Art.6 PCT).

Claims

1. An extrusion coated substrate having a coating
5 comprising a multimodal polyethylene produced by polymerization catalysed by a single site catalyst and comprising as comonomers to ethylene at least two different C_{4-12} alpha olefins.
- 10 2. An extrusion coated substrate as claimed in claim 1 wherein said polyethylene comprises as comonomers to ethylene at least two alpha olefins selected from but-1-ene, hex-1-ene, 4-methyl-pent-1-ene, hept-1-ene, oct-1-ene, and dec-1-ene.
- 15 3. An extrusion coated substrate as claimed in claim 2 wherein said polyethylene comprises an ethylene butene copolymer and an ethylene hexene copolymer.
- 20 4. An extrusion coated substrate as claimed in claim 1 wherein said polyethylene comprises a bimodal terpolymer comprising
 - 25 a) a lower molecular weight copolymer of ethylene and but-1-ene
 - b) a higher molecular weight copolymer of ethylene and a C_5 to C_{12} alpha-olefin,
- 30 5. An extrusion coated substrate as claimed in claim 1 wherein said polyethylene comprises a bimodal polymer comprising
 - 35 a) a lower molecular weight polymer which is a binary copolymer of ethylene and a C_4 to C_{12} alpha-olefin and
 - b) a higher molecular weight polymer which is

5 either a binary copolymer of ethylene and but-1-ene, if the lower molecular weight polymer of a) is a binary copolymer of ethylene and a C₅ to C₁₂ alpha-olefin, or a terpolymer of ethylene, but-1-ene and a C₅ to C₁₂ alpha-olefin.

10 6. An extrusion coated substrate as claimed in claim 1 to 5 wherein said polyethylene has an MWD 3 to 6, an MFR₂ of 5 to 20 g/10min and a density of 905 to 930 kg/m³.

15 7. An extrusion coated substrate as claimed in claim 1 to 6 wherein said polyethylene has a heat sealing force which varies by less than 2N/25.4 mm over a temperature range of at least 30°C.

8. An extrusion coated substrate as claimed in claim 1 to 7 wherein said coating comprises LDPE.

20 9. An extrusion coated substrate as claimed in claim 8 wherein LDPE forms 15 to 35 wt% of the coating.

10. An extrusion coated substrate as claimed in claim 1 to 9 comprising multiple coating layers.

25 11. An extrusion coated substrate as claimed in claim 1 to 10 wherein said substrate is paper, cardboard, a polyester film, cellophane, polyamide film, polypropylene film, oriented polypropylene film or aluminium foil.

30 12. The use of a multimodal polyethylene produced by polymerization catalysed by a single site catalyst and comprising as comonomers to ethylene at least two different C₄₋₁₂ alpha olefins in extrusion coating or for
35 the formation of cast films.

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13. A process for extrusion coating a substrate comprising extruding a multimodal polyethylene produced by polymerization catalysed by a single site catalyst and which comprises as comonomers to ethylene at least two different C_{4-12} alpha olefins to form a polymer melt and coating a substrate with said melt.
14. A process as claimed in claim 13 wherein said polyethylene is produced in a two-stage process comprising a loop reactor followed by a gas phase reactor.
15. A process as claimed in claim 13 or 14 wherein said polyethylene is blended with LDPE prior to extrusion.

AMENDED SHEET